

What is claimed is:

1. A protecting route design method for a communication network including a plurality of nodes having preset information on a protecting route to switch over in parallel  
5 from a working route thereto when link or node failure occurs, according to a failure notification message including failure location information being transmitted from a failure detection node to each node, the protecting route design method comprising the steps of:

10 searching a protecting route which can minimize a transfer time of the failure notification message from the failure detection node; and

then, updating the searched protecting route to a protecting route having a spare communication capacity  
15 sharable for a different failure and having a route switchover time to be completed within a given time limit.

2. The protecting route design method according to claim 1, wherein the transfer time of failure notification  
20 message from the failure detection node is calculated from a summation of a transmission delay time of the failure notification message being transmitted on communication links and an input and output processing time of the failure notification message processed in the each node.

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3. The protecting route design method according to claim 1, wherein a switchover time to the protecting route in

each node is calculated from a difference between a given restoration time limit and the transfer time of failure notification message to the each node.

5 4. The protecting route design method according to claim 2, wherein a switchover time to the protecting route in each node is calculated from a difference between a given restoration time limit and the transfer time of failure notification message to the each node.

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5. The protecting route design method according to claim 1, wherein a restoration time of the protecting route is obtained by calculating a summation of the transfer time of failure notification message to each node and a 15 switchover time to the protecting route in each node, then by extracting the maximum value of the summation for entire nodes along the protecting route.

6. The protecting route design method according to claim 20 1, wherein another protecting route is searched excluding a link which has not any sharable spare communication capacity between the end nodes of the route, so as to reduce a total spare communication capacity and a route search time.

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7. The protecting route design method according to claim 1, wherein another protecting route is searched affording

priority to a link having a large sharable spare communication capacity between the end nodes of the route, so as to reduce a total spare communication capacity and a route search time.

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8. The protecting route design method according to claim 7, wherein, at the time of the search of another protecting route by affording priority to a link having a large sharable spare communication capacity, a sharable spare communication capacity value exceeding any value assigned to other link is temporarily afforded to a link on a working route, so as to reduce a transfer time of the failure notification message from the failure detection node to each node along the protecting route.

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9. The protecting route design method according to claim 1, wherein another protecting route is searched excluding a node at which a transfer time of the failure notification message exceeds a predetermined restoration time, so as to reduce a route search time.

10. The protecting route design method according to claim 2, wherein calculation of a transfer time of a failure notification message is selectively employed depending on a topology or a scale of an object communication network, a node equipment specification, and a communication system.

11. The protecting route design method according to claim  
3, wherein calculation of a switchover time to a protecting  
route is selectively employed depending on a topology or  
a scale of an object communication network, a node equipment  
5 specification, and a communication system.

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